Economic input data for electricity system modelling: A public consultation on generation resources

Fields marked with * are mandatory.

Consultation Background & Scope

This survey seeks your views on a new EU-wide dataset of economic parameters of standard capacity resource technologies (generation, storage and demand response) at Member State level. The consulted data set is provided by a consultancy study ACER run with RINA. It is based on the relevant ACER methodology and builds on a previous exploratory study.
The economic parameters will used to reinforce the input assumptions for the European Resource Adequacy Assessment (ERAA) assessing potential future deployment of new adequacy resources. The values will also support the calculation of reliability metrics against which the resource adequacy needs are set. It helps Member States in the procedure of fast-track approval of capacity mechanisms under **the new State aid framework**.
The dataset contains estimated economic parameters for new power generation technologies and demand response: capital, fixed and variable costs, and investment potential. The values are provided as average figures per standard technology type, aggregated to reflect typical market conditions within each Member State.
By participating, stakeholders can help ensure that modelling assumptions accurately reflect current market realities and technological developments and strengthen adequacy assessments. Your feedback therefore directly contributes to the transparency and robustness of the EU framework ensuring resource adequacy.

Technology Categorization
In line with the Adequacy Metrics Methodology approved by ACER in 2020, the calculation of the CONE is limited to technologies that meet specific criteria to be considered standard. These criteria include being reliable, having generic cost information available for cost components, and having costs that are consistent from one project to another. Furthermore, the development of the technology should not be heavily constrained by technical limitations. This approach ensures that only technologies with well-established costs and a refined level of development are taken into account.
The survey therefore focuses on the techno-economic parameters and potential for the following technologies:

- Gas Combine Cycle Gas Turbine (Gas CCGT)
- Gas Open Cycle Gas Turbine (Gas OCGT)

- Hydrogen Combine Cycle Gas Turbine (H2 CCGT)
- Hydrogen Open Cycle Gas Turbine (H2 CCGT)
- Electrochemical Utility-Scale Storage (Batteries)
- Demand Side Response (DSR)

Economic Parameters

The main parameters analysed for the different technologies are:

- Capital Cost (CAPEX) [EUR/kW] - the costs to develop, construct or refurbish a capacity resource that are incurred during the construction period of that capacity resource.
- Annual Fixed Cost (FOM) [EUR/kW/year] - the yearly costs incurred in the context of operation of a capacity resource once the capacity resource starts operating, independently from the generated (or curtailed, in the case of DSR) energy volume.
- Variable Cost (VOM) [EUR/MWh] - the average variable cost of generation over the economic lifetime of that resource. For the purposes of this study, VOM does not include fuel costs and CO2 emissions costs, as they typically are considered separately in adequacy assessments and hence are not consulted in this exercise.
- Activation price (for DSR) [EUR/MWh] - the average of the minimum market prices for activation of a capacity resource over the economic lifetime of that resource.
- Weighted Average Cost of Capital (WACC) [%] - the cost of capital (before corporate income taxes are applied) of a business firm in which each category of capital is proportionally weighted.
- Additional investment potential [MW] - the additional amount of capacity resource which may be built by a rational investor by 2030.

For each of this parameter, the following has been considered:

- Economic values are expressed in real terms including inflation effects.
- All values refer to 2030, incorporating technical and market changes.

According to the Adequacy Metrics Methodology, the above parameters are crucial for the determination of a desired level of security of supply and for the purpose of adequacy assessments.
The assumptions underlying this study are based on a comprehensive analysis of the most prevalent technical parameters, ensuring that the outcomes are both relevant and reliable.

NOTE: *“Lifetime” indicates the economic lifetime (i.e. the period during which a capacity resource remains operational to a rational private investor).*

Data Protection

ACER will process personal data of the respondents in accordance with Regulation (EU) 2018/1725, taking into account that this processing is necessary for performing ACER’s consultation tasks.

More information on data protection is available on ACER's website and in ACER’s data protection notice.

ACER will not publish personal data.

Confidentiality

Following this consultation, ACER will make public:

- the number of responses received;
- company names, unless they should be considered as confidential;
- all non-confidential responses; and
- ACER's evaluation of responses. In the evaluation, ACER may link responses to specific respondents or groups of respondents.

You may request that the name of your company or any information provided in your response is treated as confidential. To this aim, you need to explicitly indicate whether your response contains confidential information.

☑ I have read the information provided in this section.

Confidentiality Question

* Does your submission contain confidential information?

○ Yes
◉ No

Contact Information

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Job title

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Hellenic Association of Independent Power Producers (HAIPP)

Main business activity

NGOs & Industry Associations

Investment Parameters Survey

* Select one or more countries to review

- Austria
- Belgium
- Bulgaria
- Croatia
- Cyprus
- Czechia
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Malta
- Netherlands
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden

Select one or more technologies to review

- [x] Gas Combine Cycle Gas Turbine (Gas CCGT)

- [x] Gas Open Cycle Gas Turbine (Gas OCGT)
- [ ] Hydrogen-fired Combine Cycle Gas Turbine (H2 CCGT)
- [ ] Hydrogen-fired Open Cycle Gas Turbine (H2 OCGT)
- [x] Electrochemical Utility-Scale Storage (Batteries)

The consultancy study primarily covers the technologies most commonly deployed across the EU to support resource adequacy.

If other technologies are relevant in your country (e.g. pumped-storage hydropower, biomass, or similar resources), they may also be considered, provided that:

- **additional capacity of this technology can realistically be developed in your country**;
- the technology is established and proven to be reliable;
- detailed and transparent cost information is available for the main cost components;
- project costs are broadly consistent across installations (i.e. not highly site-specific or volatile);
- the technology is not heavily constrained by technical limitations.

For any such technology, please provide the relevant input parameters, including:

- Capital Cost (CAPEX) [EUR/kW]
- Annual Fixed Cost (FOM) [EUR/kW/year]
- Variable Cost (VOM) [EUR/MWh]
- Weighted Average Cost of Capital (WACC) [%]
- Additional investment potential [MW]

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Methodological_overview.pdf

Gas CCGT

- *Whole plant considered (not only the turbine)*
- *No Carbon Capture and Storage (CCS)*
- *Electric output: 500 MW*
- *Net efficiency: 57%*
- *Lifetime: 25 years*
- *Construction period: 3 years*

Greece - Gas CCGT

New resource investment for 2030	Broadly agree	Propose correction	Don't know
Capital cost: **1094** EUR/kW	◉	○	○
Annual fixed cost: **39** EUR/kW/year	◉	○	○
WACC: **8.3** %	◉	○	○
Variable cost: **1.8** EUR/MWh	◉	○	○
Additional investment potential: **505** MW	○	○	○

Please provide additional information to support your proposed corrections, including the underlying assumptions and relevant data sources.

Comment 1.

Gas OCGT

- *Whole plant considered (not only the turbine)*
- *No Carbon Capture and Storage (CCS)*
- *Electric output: 350 MW*
- *Net efficiency: 40%*
- *Lifetime: 30 years*
- *Construction period: 3 years*

Greece - Gas OCGT

New resource investment for 2030	Broadly agree	Propose correction	Don't know
Capital cost: **703** EUR/kW	◉	○	○
Annual fixed cost: **27** EUR/kW/year	◉	○	○
WACC: **8.3** %	◉	○	○
Variable cost: **3.2** EUR/MWh	◉	○	○
Additional investment potential: **505** MW	○	○	○

Please provide additional information to support your proposed corrections, including the underlying assumptions and relevant data sources.

Comment 2

Batteries

- *Lithium-Ion technology*
- *4h duration battery*
- *Electric output (discharge): 175 MW*
- *Round trip efficiency: 85%*
- *Electric efficiency: 98%*
- *Lifetime: 15 years*
- *Construction period: 2 years*

Greece - Batteries

New resource investment for 2030	Broadly agree	Propose correction	Don't know
Capital cost: **540** EUR/kW	◉	○	○
Annual fixed cost: **14** EUR/kW/year	◉	○	○
WACC: **13.6** %	◉	○	○
Variable cost: **0** EUR/MWh	◉	○	○
Additional investment potential: **2792** MW	○	○	◉

Please provide additional information to support your proposed corrections, including the underlying assumptions and relevant data sources.

Comment 3.

Contact

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Comment 1, CCGT
For Greece, the additional investment potential for new gas-fired capacity should be interpreted in the broader context of security-of-supply and adequacy needs, rather than as a direct national target for one specific standard technology. The updated Greek NECP presents aggregate large natu-ral gas capacity increasing from 6,296 MW in 2022 to 7,885 MW in 2030, while also indicating that these figures are indicative maxima based on existing plants and that the actual gas-fired capacity required in hot or cold reserve after 2030 should be determined through dedicated security-of-sup-ply studies. In this respect, the 505 MW value for a standard CCGT is understood as a stylised modelling assumption for ERAA-study purposes than as a direct extraction from the NECP. Additional clarification on the underlying data source and methodology for this value would there-fore be helpful, particularly to ensure that ERAA assumptions appropriately reflect realistic investability conditions for new firm capacity.

Comment 2, OCGT
As for CCGT, a similar consideration applies to OCGT. The Greek NECP supports the continued role of flexible thermal capacity for adequacy and reliability, but it does not provide a separate quantified target or development pipeline for OCGT as distinct from CCGT. Therefore, the 505 MW additional investment potential for a standard OCGT is interpreted as a modelling proxy consistent with the broader adequacy role of gas-fired flexibility in Greece, rather than as a directly evidenced national planning figure.
In this regard, further clarification on the underlying data source and allocation methodology for the 505 MW OCGT value would be useful, especially given that the Greek NECP does not identify a distinct OCGT-specific target or pipeline. Such clarification would help ensure that the contribution of flexible thermal capacity is assessed on the basis of transparent and realistic assumptions.

Comment 3, Batteries
The Greek NECP confirms policy support for the deployment of BESS. It projects 4,325 MW of bat-tery storage by 2030 and identifies storage as an important enabler of higher RES penetration and reduction of RES curtailment. The Greek framework has also already differentiated support arrangements by storage duration, including 2 competitive procedures for standalone storage with 2-hour duration and a further procedure for 4-hour duration, while additional extensions of support schemes are being considered. These elements show a clear national policy commitment to storage deployment.

Nevertheless, policy ambition and support-based deployment should not automatically be interpreted, for ERAA modelling purposes, with the amount of generic battery capacity that may be built by a rational investor by 2030. In particular, additional clarification on the data sources and methodological basis for the battery assumptions would be welcome, esp. regarding the 2,792 MW investment potential, the use of a single 4-hour storage battery type, and the representation of CAPEX solely in EUR/kW. For batteries, CAPEX expressed only in EUR/kW is less informative unless duration is fixed ex ante, since battery economics depend materially on both power capacity and energy capacity. As the standard technology in the survey is a 4-hour battery, the CAPEX value can be interpreted within that specific type. However, for reasons of transparency and representativeness, it could be useful for ERAA modelling to distinguish storage by duration class, for example 2-hour and 4-hour BESS assets, with separate techno-economic parameters and, where feasible, separate investment-potential values in both MW and GWh. This would help avoid overstating the extent to which different storage products can be treated as equivalent in adequacy modelling and would be more closely aligned with the way storage support frameworks are already evolving in practice.